



Cactus Moth Detection and Monitoring Network on Public and Private Lands in the United States. A partnership between USDA-APHIS, USGS, and Mississippi State University
Progress Report August 2005

Introduction. Cactus moth (*Cactoblastis cactorum*), one of the most successful biological control agents in history, has been transported around the world in various prickly pear cactus control programs. By 2002, free-living populations of the moth had spread from the Florida Keys to the Florida Panhandle and South Carolina. It now poses a serious threat to native prickly pear cactus populations in the American Southwest, as well as the cactus industry and desert ecosystems in Mexico.

A research, extension, and coordination effort to monitor the spread and develop integrated control of cactus moth has been developed as part of collaborative research between USGS and Mississippi State University, with assistance from USDA-APHIS. This project has the following components: Early Detection and Reporting of Cactus Moth, Distribution of Prickly Pear Cactus in the Region, Cactus and Cactus Moth Extension Information, Web-Based Database of Cactus and Cactus Moth Locations, and Regional Coordination

I. Early Detection and Reporting of Cactus Moth. R. Brown, V. Maddox, BJ Lewis, and R. Westbrooks.

Task Description: Cactus moth detection techniques will be tested to find an optimal approach for detection, and a network of detection sites at known cactus locations will be implemented. The MSU insect collection will develop instructional information for potential volunteer monitors at the selected monitoring sites, and provide for moth species verification and vouchering.

Summary of Objectives:

1. Develop and test techniques for (a) detecting cactus moth infestations, (b) delimiting infested areas, and (c) determining effectiveness of control actions.
2. Develop a cactus moth detection network in the project area.
3. Develop protocols for monitoring native and ornamental cactus populations.
4. Develop protocols for reporting and verifying suspected cactus moth infestations.

Progress this month:

- Identification of all moths collected with 66 pheromone traps from locations in Alabama, Arizona, Louisiana, Mississippi, and Texas. Cactus moths were identified from 5 traps at Ft. Morgan, Alabama collected 2 August (16 moths) and 9 August (2 moths).
- Examined *Cactoblastis cactorum* egg sticks with scanning electron microscope.
- Obtained cactus moth larvae from three states, and these were sent to Thomas Simonson, University of Alberta, for molecular research to determine any differences between geographical populations.
- Surveyed *Opuntia* species at 13 sites in Arizona, California, New Mexico, and Texas for presence of cactus feeding larvae. Larvae of native species of *Melitara* were found at five sites. Three color forms of larvae have been photographed and are being reared to obtain identifiable adults (with Todd Gilligan, Ohio State University).
- To date, 22 Cactus Moth Sentinel Sites have been established in the Carolinas.
- The National Cactus Moth Detection and Reporting Network works. A sentinel site established on the Isle of Palms, SC, on April 5, 2005, was heavily infested by Cactus Moth on July 13th. It is amazing how much damage the Cactus Moth can do to a prickly pear population in 12 weeks.

II. Distribution of Opuntia in the Region. R. Brown, G. Ervin, B.J. Lewis, V. Maddox, R. Westbrooks

Task Description: MSU staff, natural resource agency professionals, and volunteers will be used to search for populations of *Opuntia* cactus in the region. Native cactus populations will be located using herbarium records, contact of federal, state, and NGO biologists, and surveys. The location and description of all *Opuntia* cactus populations in the region and of cactus moth monitoring sites will be placed on a web-accessible database, as part of extension efforts listed below. We will also develop a spatial model to predict cactus distribution.

Summary of Objectives:

1. Develop and test methods to locate and map populations of cactus in support of surveys to detect and delimit cactus moth infestations in the region
2. Utilize professionals and volunteers to survey cactus locations in the Southeastern region.
3. Develop a cactus distribution prediction model

Progress this month:

- Pricklypear mapping trip to MS gulf coast to Fort Morgan, AL adding 23 new data points.
- Mapping trip to MS delta added 41 new data points and continued mapping in other parts of MS.
- Continue to receive public reports on pricklypear locations in MS.
- Hurricane Katrina will postpone mapping trips planned for the MS barrier islands (trap data forms) with NPS and BJ Lewis (USDA-APHIS), the Pascagoula and Escatawpa River systems (*Opuntia* mapping and sentinel site discussion with land agency) with BJ Lewis, and the Chandeleurs in S. Louisiana.
- Continued data collection at semi-permanent cactus plots in MS and AL to evaluate environmental conditions contributing to growth.
- Prepared field sampling design of 640 random points across MS and AL, stratified by land use-land cover classes, to assist in collecting random data for statistical analysis and use in development of habitat models.
- Set up greenhouse experiment to assess impacts of invasive plants on native cacti.

III. Cactus And Cactus Moth Extension Information. R. Brown, V. Maddox, J. Madsen

Task Description: We will develop web-based information to aid in the identification of cactus and the cactus moth.

Summary of Objectives:

1. Web-based educational materials on cactus and the cactus moth
2. Educational program on cactus moth, including on-line and printed fact sheets and brochures.

Progress this month:

- Information on cactus moth conveyed to interested members of the public by telephone, mail, and e-mail.
- Cactus moth information available via the MSUcares website at:
<http://msucares.com/lawn/garden/msgardens/05/050725.html>

IV. Web-based database for cactus and cactus moth distribution. C. Abbott, V. Maddox, J. Madsen

Task Description: We will develop a web-based avenue for reporting suspected locations on the web, and web GIS database to display the movement of the moth and locations of natural cactus populations.

Summary of Tasks:

1. Operational web database for locating and mapping cactus and cactus moth populations.

Progress this month:

- Re-entry of Steven Hight's data completed to include cactus moth visual observation data forms in database.
- Abstract developed for the NBII All-Node Meeting in October 2005 on the cactus moth database web page

V. Coordination. J. Madsen

Task Description: A collaborative project of this size involving multiple agencies requires a concerted effort to coordinate activities and agree on the tasks to be done and data to be collected.

Coordination activities this month:

- Presentation to the NBII Invasive Species Working Group teleconference entitled "A Web-Based Database For The National Cactus Moth Detection Network," by John Madsen, on August 25.
- Presented all invasive species activities, including cactus moth activities and web page, to the NBII SAIN videoconference on August 22.

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